

## Questions and Answers for PON-13-506

March 28, 2014

1. **The solicitation, PON-13-506, says that the proposals must be based on existing engines....but I do not know of any engines that meet the NOx exhaust standard of 0.01. The closest are those engines in the new AQMD truck program with 90% reduction of NOx or 0.02 in the exhaust (awards were to Cummins and to Cummins-Westport). Thus it looks like a significant and new engine/aftertreatment system is needed ...would this approach conflict with the statement in the announcement. Since ARB and others are targeting 90% reduction of NOx standard, why did the CEC go even lower?**

Please reference Addendum 2. The requirement that projects should "Demonstrate ability to achieve emissions targets of: (1) 0.01 g/bhp-hr NOx; (2) 0.01 g/bhp-hr PM; (3) 0.14 g/bhp-hr HC; and (4) 15.5 g/bhp-hr CO or lower, as determined by the heavy-duty engine FTP" has been removed.

2. **Would a Hybrid Genset that Metis Design is developing which includes, a Battery ranged for 60-90 miles, a micro turbine generator range extender + recuperator be eligible for funding? The goal would be to have an electric drive system, and a backup range extender. The back up range extender would be to eliminate range anxiety and allow for the full use of the electric battery system. The backup range extender system would be lighter, cleaner burning, and extremely efficient vs. a conventional reciprocating engine. Would this be eligible for funding?**

As stated on Page 8 of the PON under B. Eligible Projects, Section 1. Technologies and Benefits, "Eligible projects will demonstrate promising technologies that advance the performance and improve the fuel efficiency, emissions, and economic viability of natural gas engine hybrid-electric systems, based on existing natural gas engines suited to power Class 3-8 vehicles." This objective of this solicitation is augment hybrid electric technology to natural gas engines; therefore, a micro turbine generator would not qualify.

3. **Under section II. Eligibility Requirements, B. Eligible Projects, 1. Technologies and Benefits there is a bulleted list of the minimum items that an eligible project must demonstrate. Bullet number 3 calls out specific emissions targets in terms of g/bhp-hr. Our understanding is that the current certification requirement for Otto cycle engines for NOx emissions is 0.2 g/bhp-hr. Can you clarify that proposed projects must demonstrate NOx emissions of 0.01 g/bhp-hr to be considered eligible?**

Please reference Addendum 2. The requirement that projects should "Demonstrate ability to achieve emissions targets of: (1) 0.01 g/bhp-hr NOx; (2) 0.01 g/bhp-hr PM; (3) 0.14 g/bhp-hr HC; and (4) 15.5 g/bhp-hr CO or lower, as determined by the heavy-duty engine FTP" has been removed.

4. **All of the emission targets referenced in question 1 would have to be measured on an engine dynamometer because they are specified in g/bhp-hr. There are currently no established, standard procedures for conducting engine dynamometer emissions testing with either a conventional or hybrid drivetrain connected to the engine. Therefore, this would, by definition, be an engine only test. Can you clarify, if a project intends to use a currently CARB certified NG engine, is separate engine dynamometer emissions testing required in order for a project to be considered eligible under this program?**

Please reference Addendum 2. The projects should “Demonstrate ability to achieve emissions targets of: (1) 0.01 g/bhp-hr NO<sub>x</sub>; (2) 0.01 g/bhp-hr PM; (3) 0.14 g/bhp-hr HC; and (4) 15.5 g/bhp-hr CO or lower, as determined by the heavy-duty engine FTP” has been removed.

The following has been added under “should also maximize benefits as follows” category: “Demonstrate progress towards the proposed emission reduction goal for base natural gas engines in a heavy-duty hybrid electric vehicle in urban California operation.”

Proposals should specify the methodology or basis on the emission reductions.

5. **Under the same section referenced in questions 1 & 2, bullets 4 and 5 specifically address improving thermal and partial load fuel efficiency. One way that a hybrid drive train can improve vehicle efficiency is by managing engine operation to avoid operating the engine at certain partial load points and other areas of poor thermal efficiency. However, a hybrid drive train will not have any impact on the engine’s thermal efficiency or partial load efficiency at any specific operating points. Those improvements would require changes to engine software and/or hardware. Any such changes would require extensive testing and recertification of the engine. Can you clarify whether projects must be proposed by or in cooperation with engine manufacturers in order to be considered eligible?**

Please reference Addendum 2. The 4<sup>th</sup> bullet on Page 8 of the PON under the “must demonstrate” has been revised to read “Improvements in vehicle fuel efficiency when compared to conventional vehicles in the same application and same duty cycle. Proposals should include conventional vehicles as the baseline for validating improvements.”

The 5<sup>th</sup> bullet has been revised to read “Improved fuel efficiency at part-load operation.”

6. **If my Engine does not focus on optimizing previously developed engines, but rather have developed a new technology, does this definitely preclude me from this particular Grant?**

No, a project is not required to utilize a previously developed engine, however the purpose of this solicitation is not to develop a new engine, but rather develop a natural gas engine hybrid-electric system that will be optimized for a given application.

7. **The PON names electric hybrids in the title, however there are other types of hybrids available with similar benefits to electric. Will you consider types of hybrids other than**

**electric, i.e. hydraulic or kinetics? For my company's business plan could you explain how this was decided and the reasoning for electric hybrids were singled out over other viable technologies?**

This PON focuses only on hybrid electric technology. Hybrid electric technology was prioritized over other technologies based on the research and development needs and the opportunity to fit a broader vehicle market.

- 8. Can you please also tell me how you've defined "electric"? Is it the battery? If so, how do you define "battery"? Please clarify with technical specifics.**

The PON targets research and development of hybrid-electric technology. The "electric" definition is relative to electrical energy. The "battery" is the storage means for electrical energy used in conjunction with the natural gas engine. The "battery" can be any device used to store and retrieve electrical energy for the purpose of propelling the vehicle. For the purposes of this solicitation, ultracapacitors can be used as electrical storage.

- 9. Does the CEC prefer any specific type of hybrid configuration for this solicitation?**

The PON is open to various hybrid configurations with preference for those designs that maximize fuel efficiency and emissions reductions for a given vehicle application.

- 10. Does the applicant have to specifically define the duty cycle for a given app?**

While not a specific requirement, the duty-cycle information is evaluated under the Scoring Criteria 1. Technical Merit and Need, item F which specifies "Describes in detail how the hybrid application is the optimal solution for the proposed vocation/application with regard to duty cycle, maximizing fuel economy, and propulsion requirements, and how the proposed hybrid system would be successful in commercial markets."

- 11. Do emission requirements need to be demonstrated in the project?**

Systems developed under this solicitation should aim to meet heavy-duty certification requirements; Addendum 2 describes the revised emission requirements for this PON.

- 12. What are the weight requirements for light heavy-duty (LHD) to heavy heavy-duty (HHD)? How would you classify the LHD to HHD weight requirements?**

For this solicitation the weight requirements cover Light-Heavy-Duty, Medium-Heavy-Duty and Heavy-Heavy-Duty. Light-Heavy-Duty (Class 3) is 10,001 to 14,000 lbs, Medium-Heavy-Duty (Class 4 through Class 7) is 14,001 to 33,000 lbs, Heavy-Heavy-Duty (Class 8) is 33,001 lbs and over.

**13. On a natural gas engine, would it be acceptable to use a diesel start?**

Using diesel for pre-ignition (i.e. dual fuel) is acceptable, however under this solicitation, engines that have the capability to run on diesel only (i.e. bi-fuel) will not be considered eligible.

**14. In regards to the use of existing natural gas engines, do these engines have to be engines that are already approved and used in the existing market? Or can the engines have already been developed?**

Engines that have been developed but are currently not available in the market are acceptable. The engine should be an existing engine that has been developed, as the purpose of this solicitation is not for engine development. Additional information on the engine being considered for the project should be included in the submitted proposal.

**15. I have an existing engine suitable for class 3-6 vehicles and want to integrate it into a class 8 vehicle. Would this qualify under this solicitation?**

While there are no engine size requirements for a given class of vehicles, the PON strives to advance the performance and improve the fuel efficiency, emissions, and economic viability of natural gas engine hybrid- electric systems for Class 3 through Class 8 vehicles.

**16. For match funding, the application manual states that match funding is not required, however match funding is listed as one of the scoring criteria. How will this impact the overall scores of the applications?**

Providing no match funding will not negatively affect applicant scores, however proposals that include match funding will receive additional points based on the percentage of match funding relative to the proposed funding amount. The ratio for match fund score is listed on Page 23 of the PON Application Manual under Scoring Criteria, Item 6. Match Funds.

**17. Is an original wet signature on the application cover page needed when submitting the application packets?**

Yes. Applicants should submit at least one original proposal with an original signature and 5 additional copies.

**18. Are dual-fuel vehicles allowed? Would natural gas dedicated vehicles score higher?**

Dual-fuel vehicles are allowed provided the vehicles don't have the capability to run on the conventional fuel alone.

**19. Will the presentation be available to the participants of this call (through email)?**

Yes, the presentation and workshop recording is currently available at:  
<http://www.energy.ca.gov/contracts/pier.html#PON-13-506>

20. **The PON names electric hybrids in the title, however there are other types of hybrids available with similar benefits to electric. Will you consider types of hybrids other than electric, i.e. hydraulic or kinetics.?**

This PON focuses only on hybrid electric technology. Hybrid electric technology was prioritized over other technologies based on the research and development needs and the opportunity to fit a broader vehicle market.

21. **Would spark ignited NG engine efficiency improvements married to mild hybrids, or start/stop be OK?**

Provided the natural gas engine improvements are necessary to incorporate the use of the hybridization technology, it would be allowed but evaluated based on the scoring criteria.

22. **To what degree does vehicle affordability enter into the scoring?**

The proposals must demonstrate the commercial and economic viability, as stated on Page 8 under Section 1. Technologies and Benefits, and will be evaluated based on Scoring Criteria section 1. Technical Merit and Need.

23. **How many awards are you planning to grant and what would be the average amount for the awards?**

The maximum amount of funding that can be requested per applicant under this solicitation is \$900,000; therefore, approximately three projects are expected to be awarded funding.